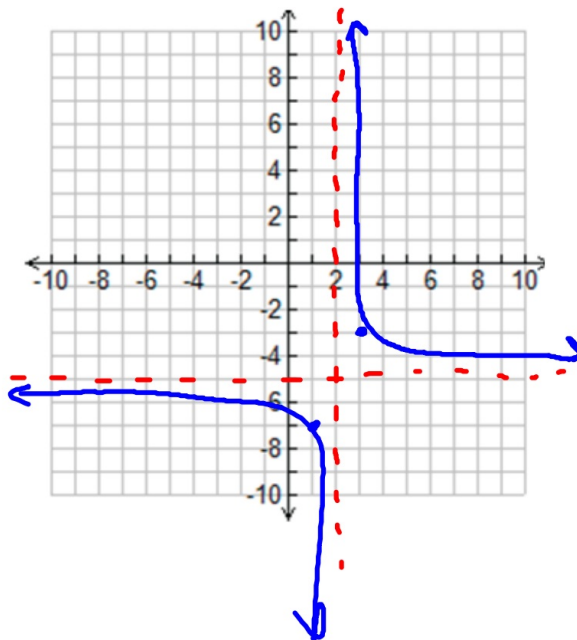


Bellwork: 4/12/13

Graph the following function:

$$y = \frac{2}{x-3} - 5$$

$$a = 2$$
$$(h, k)$$
$$(3, -5)$$



Section 8.3 - Finding Vertical and Horizontal Asymptotes

*restrictions*

To find a vertical asymptote, set the denominator equal to 0 and solve for  $x$ . The answer(s) are the values that  $x$  CANNOT be. Vertical asymptotes are  $x = \#$ .

examples:

$$1) \frac{2x-5}{x+7}$$

$$x+7=0$$

$$VA: x = -7$$

$$2) \frac{3x+19}{(x-2)(x+4)}$$

$$x-2=0 \quad x+4=0$$

$$VA: x = 2, -4$$

$$3) \frac{x^2+5x-9}{x^2-7x+12}$$

$$(x-4)(x-3)$$

$$x-4=0 \quad x-3=0$$

$$VA: x = 4, 3$$

Finding horizontal asymptotes is all based on the <sup>highest exp.</sup> degrees of the numerator and denominator...horizontal asymptotes are  $y =$

If the degree is bigger on the top there are NO horizontal asymptotes. example:  $\frac{x^2}{x}$  none

If the degree is bigger on the bottom, the horizontal asymptote is  $y = 0$ . example:  $\frac{x}{x^2}$   $y = 0$

If the degrees are the same, the horizontal asymptote is the leading coefficients of each highest exponent. example:  $\frac{2x}{3x}$   
 $y = \frac{2}{3}$

examples:

4)  $\frac{3x^1 - 8}{x^2 - 5x + 6}$

bottom

$y = 0$

5)  $\frac{3x^3 - 4x^2 + 7}{x^3 - 6}$  same

$y = 3$

6)  $\frac{x^2 + 8x - 1}{9x - 4}$  <sup>top</sup>

none

Putting it all together:

Find the Vertical and Horizontal Asymptotes for each function:

7)  $\frac{x+1}{(x-2)(x-3)}$  bottom  $x-2=0$   $x-3=0$   
 8)  $\frac{2x}{x-6}$  same  $x-6=0$   
 9)  $\frac{x^2-9}{3x-12}$  top  $3(x-4)$   $3x-12=0$   
 $3x=12$   
 $x=4$

den=0  $x=2,3$   
 VA:  $x=2,3$   
 HA:  $y=0$   
 rules  $y=0$

den=0  $x=6$   
 VA:  $x=6$   
 HA:  $y=2$   
 rules  $y=2$

den=0  $x=4$   
 VA:  $x=4$   
 HA: none  
 rules none

10)  $\frac{-2x+6}{x-5}$  same  $x-5=0$

VA:  $x=5$   
 HA:  $y=-2$

11)  $\frac{x-1}{x^2-4x+4}$  bottom  $(x-2)(x-2)$   
 $x-2=0$

VA:  $x=2$   
 HA:  $y=0$

12)  $\frac{x^3-4x+7}{2x^2-7x+6}$  top 12  
 $(2x^2-4x-3x+6)$   
 $2x(x-2)-3(x-2)$   
 $(2x-3)(x-2)$   
 $x=\frac{3}{2}, 2$

VA:  $x=\frac{3}{2}, 2$   
 HA: none

Homework: Worksheet 8.3

